

2021 Astrophysics Medium Explorer (MIDEX) & Mission of Opportunity (MO) Solicitations

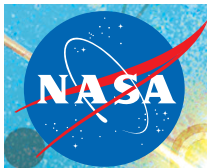
Pre-Proposal Conference *Technical, Management, and Cost Evaluation*

Behzad Raiszadeh & Odilyn Luck

Acquisition Managers

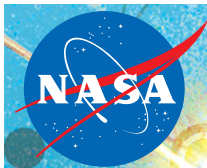
NASA Science Office for Mission Assessments

September 14, 2021



Outline

- Technical, Management, and Cost (TMC) Evaluation
- MIDEX AO & SALMON-3 AO PEA Q Highlights
- MIDEX AO Highlights
- SALMON-3 PEA Q Highlights
- References
- Questions



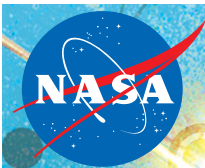
Glossary

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AO	Announcement of Opportunity
SALMON-3	Stand-ALone Mission of Opportunity Notice-3
PEA	Program Element Appendix to SALMON-3
TMC	Technical, Management, and Cost
MO	Mission of Opportunity



TMC Evaluation



TMC Evaluation

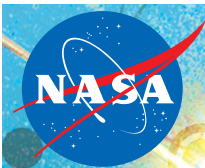
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Evaluation criteria

- Science Merit of the Proposed Investigation
- Science Implementation Merit and Feasibility of the Mission or Investigation
- **TMC Feasibility of the Mission or Investigation Implementation**

Weighting: The first criterion is weighted approximately 40%; the second and **third criteria are weighted approximately 30% each.**

TMC Evaluation: The purpose of the TMC evaluation is to assess the likelihood that the submitted mission or investigations' technical and management approaches can be successfully implemented as proposed, including an assessment of the likelihood of the completion within the proposed cost and schedule.



TMC Evaluation

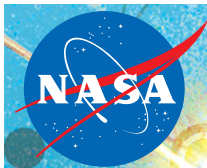
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TMC Evaluation criteria

TMC evaluation criteria are stated in the following sections.

- MIDEX AO, Section 7.2.4, “TMC Feasibility of the Proposed Mission Implementation”
- SALMON-3 AO, Section 7.2.4, “TMC Feasibility of the Investigation Implementation”

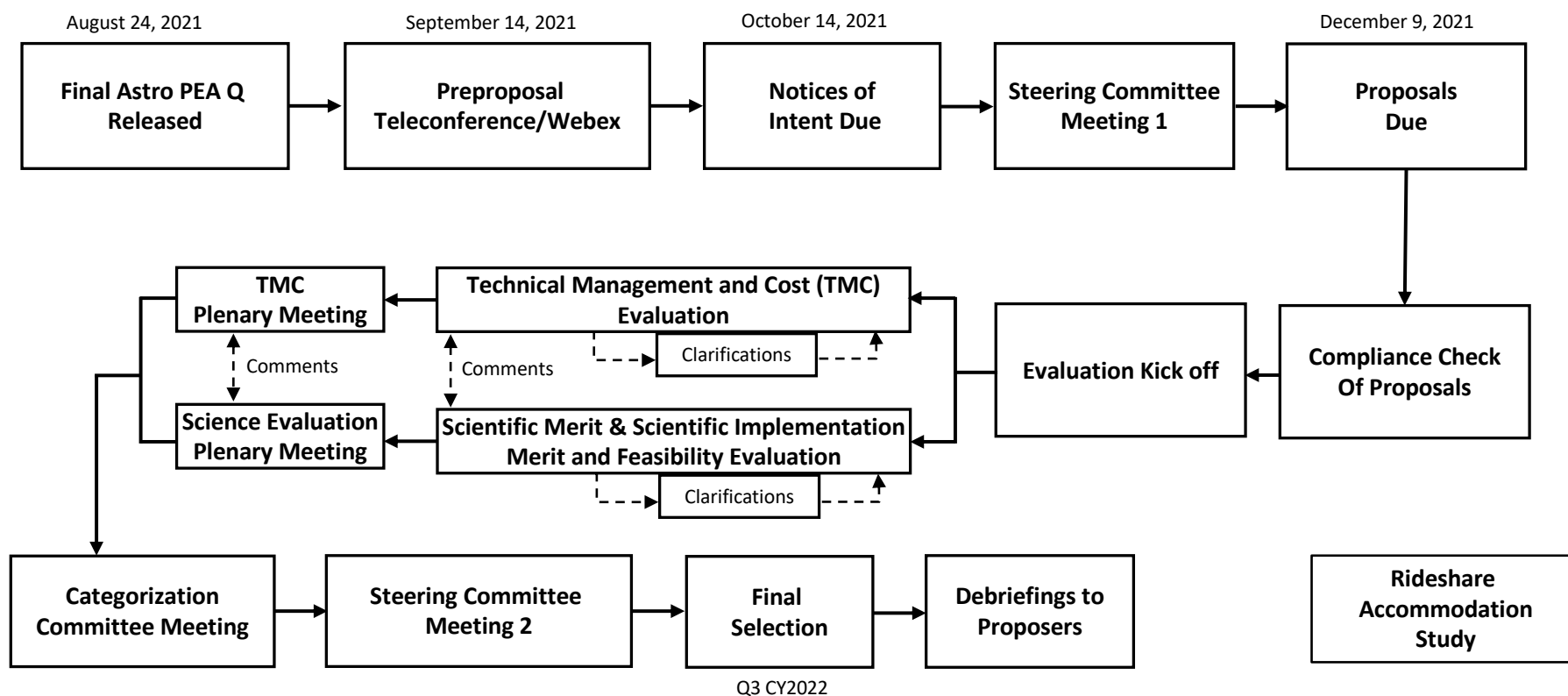
Note: The 2021 Astrophysics Explorer Mission of Opportunity (MO) solicitation is Program Element Appendix (PEA) Q to the SALMON-3 AO. **Those proposing to the Astrophysics MO must read the SALMON-3 AO and the Astrophysics MO PEA Q carefully, and proposals must comply with the requirements, constraints, and guidelines contained within these documents.**

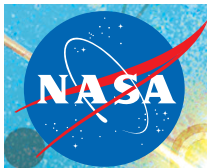


Evaluation, Categorization, and Selection Process

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Proposal Evaluation Flow





TMC Evaluation

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TMC Evaluation Factors

The following are highlights of the criteria listed in the MIDEX AO, Section 7.2.4 and SALMON-3 AO, Section 7.2.4 – TMC Feasibility of the Proposed Mission or Investigation Implementation, including Cost Risk.

The technical and management approaches of all submitted investigations will be evaluated to assess the likelihood that they can be successfully implemented as proposed, including an assessment of the likelihood of their completion within the proposed cost and schedule. The factors for feasibility of investigation implementation include the following, **as applicable** for the investigation being proposed.

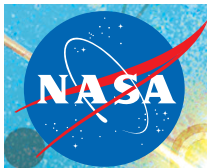
Factor C-1. Adequacy and robustness of the instrument implementation plan.

Factor C-2. Adequacy and robustness of the mission or investigation design and plan for mission operations.

Factor C-3. Adequacy and robustness of the flight systems.

Factor C-4. Adequacy and robustness of the management approach and schedule, including the capability of the management team.

Factor C-5. Adequacy and robustness of the cost plan, including cost feasibility and cost risk.



TMC Evaluation

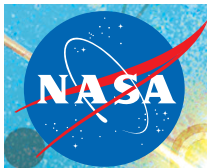
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Principles of Evaluation

- All proposals are to be treated fairly and equally.
- Merit is to be assessed on the basis of material in the proposal and clarification process (if applicable).
- Evaluation Ratings reflect the written strengths and weaknesses.
- Everyone involved in the evaluation process is expected to act in an unbiased objective manner; advocacy for particular proposals is not appropriate.

General Evaluation Ground Rules

- All proposals are evaluated to uniform standards established in the solicitation, and without comparison to other proposals.
- All evaluators are experts in the areas that they evaluate.
- Non-panel/mail-in evaluators (to provide special science expertise to the Science Panel) and specialist evaluators (to provide special technical expertise to the TMC Panel) may be utilized, respectively, based on need for expertise in a specific science or technology/engineering area that is proposed.



TMC Evaluation

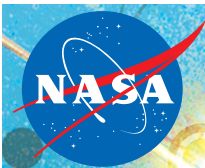
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TMC Evaluation Findings

Major and minor strengths and weaknesses are defined as follows:

- **Major Strength:** A facet of the implementation response that is judged to be well above expectations and can substantially contribute to the ability of the project to meet its technical requirements on schedule and within cost.
- **Minor Strength:** A strength that is worthy of note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.
- **Major Weakness:** A deficiency or set of deficiencies taken together that are judged to substantially weaken the project's ability to meet its technical objectives on schedule and within cost.
- **Minor Weakness:** A weakness that is sufficiently worrisome to note and can be brought to the attention of Proposers during debriefings, but is not a discriminator in the assessment of risk.

Note: Findings that are considered “as expected” are not documented.



TMC Evaluation

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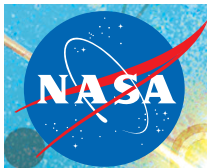
There are three possible Risk Ratings: LOW, MEDIUM, HIGH

TMC Evaluation - The purpose of the TMC evaluation is to assess the likelihood that the submitted missions or investigations' technical and management approaches can be successfully implemented as proposed, including an assessment of the likelihood of their completion within the proposed cost and schedule.

LOW Risk: There are no problems evident in the proposal that cannot be normally solved within the time and cost proposed. Problems are not of sufficient magnitude to doubt the Proposer's capability to accomplish the investigation well within the available resources.

MEDIUM Risk: Problems have been identified, but are considered within the proposal team's capabilities to correct within available resources with good management and application of effective engineering resources. Mission design may be complex and resources tight.

HIGH Risk: One or more problems are of sufficient magnitude and complexity as to be deemed unsolvable within the available resources.



TMC Evaluation

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TMC Envelope Concept

Envelope: Contains all TMC Resources available to handle known and unknown development problems that occur. Includes schedule and funding reserves; reserves and margins on physical resources such as mass, power, and data; descope options; fallback plans; and personnel.

LOW Risk: Required resources fit well within available resources.



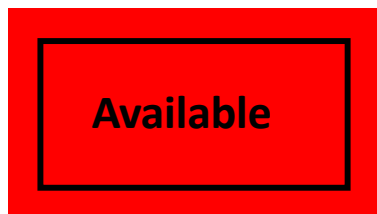
← Available (Technical, Management, Cost Resources)

MEDIUM Risk: Required resources just barely inside available resources.

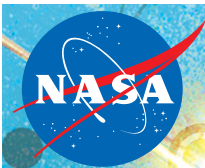


← Available (Technical, Management, Cost Resources)

HIGH Risk: Required resources DO NOT fit inside available resources.



← Required (Technical, Management, Cost Resources)



New Clarification Process

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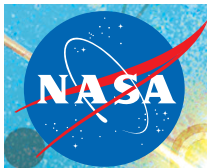
PMW Clarification Process Requirements (1 of 3)

Clarifications Responses must conform to the following requirements:

Requirement Clar-1: Proposers shall submit only two Clarification Response Documents; i.e., one for Intrinsic Science Merit of the Proposed Investigation, and Experiment Scientific Implementation Merit and Feasibility of the Proposed Investigation; and one for the TMC Feasibility of the Proposed Investigation Implementation.

Requirement Clar-2: The Clarification Response Document shall be a single unlocked (e.g., without digital signatures) searchable Adobe Portable Document Format (PDF) file, composed of the response text, figures, and/or tables. Images (e.g., figures and scans) shall be converted into machine-encoded text using optical character recognition. Animations shall not be included. Links to materials outside of the response are not permitted. Do not insert any comment fields.

Requirement Clar-3: The Clarification Response Document shall be presented in 8.5 x 11 inch paper (or A4). Text shall not exceed 5.5 lines per vertical inch and page numbers shall be specified. Margins at the top, both sides, and bottom of each page shall be no less than 1 inch if formatted for 8.5 x 11 inch paper; no less than 2.5 cm at the top and both sides, and 4 cm at the bottom if formatted for A4 paper. Type fonts for text, tables, and figure captions shall be no smaller than 12-point (i.e., no more than 15 characters per horizontal inch; six characters per horizontal centimeter). Fonts used within figures shall be no smaller than 8-point.



New Clarification Process

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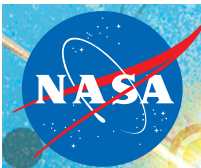
PMW Clarification Process Requirements (2 of 3)

Requirement Clar-4: For the combined responses to Scientific Merit of the Proposed Investigation (A-factors) and Scientific Implementation Merit and Feasibility of the Proposed Investigation (B-factors) PMWs, the Clarification Response Documents shall not exceed eight pages. For the TMC Feasibility of the Proposed Investigation Implementation PMWs, the Clarification Response Documents shall not exceed six pages. Text, table(s) and figure(s) are permitted, however all material shall be within the page limits specified above and limitations in Requirement 3.

Requirement Clar-5: The Clarification Response Document shall not contain International Traffic in Arms Regulations (ITAR), Export Administration Regulations (EAR), or classified material.

Requirement Clar-6: Each PMW shall be addressed and each clarification response labelled with the PMW number provided. Each PMW clarification response shall only contain information relevant to the PMW.

Requirement Clar-7: The proposers are free to provide any additional information on any criteria or requirements relevant to the proposed investigation, e.g., for TMC Feasibility of the Proposed Investigation Implementation, advances in proposed technologies since proposal submission. However, this response together with the PMW clarification responses shall fulfill requirements above and not exceed the total page limitation per Clarification Response Document.



New Clarification Process

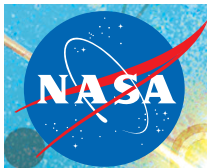
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PMW Clarification Process Requirements (3 of 3)

Requirement Clar-8: In support of each PMW clarification response, proposers shall not provide more than two references; references are restricted to peer reviewed literature. In support of any additional information response, proposers shall not provide more than three additional references; **references are restricted to peer reviewed literature.** Proposers shall not provide URLs with any of the responses.



Highlights from 2021 Astrophysics MIDEX AO and SALMON-3 PEA Q that are Common to Both



5.2.3 New Technologies/Advanced Engineering Development, MIDEX AO **(5.3.5 in SALMON-3)**

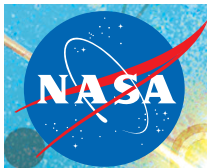
The AO and PEA solicit science missions, not technology or advanced engineering development projects. Proposed investigations are generally expected to have mature technologies, with systems at a Technology Readiness Level (TRL) of 6 or higher. For the purpose of TRL assessment, systems are defined as level 3 WBS payload developments (i.e., individual instruments) and level 3 WBS spacecraft elements (e.g., electrical power system) – **see the MIDEX and MO Program Libraries for specific examples**

Proposals with a limited number of less mature technologies and/or advanced engineering developments are permitted as long as they contain a plan for maturing systems to TRL 6 by no later than PDR and adequate backup plans that will provide mitigation in the event that the systems cannot be matured as planned.

Backup plans are required for technology not yet at TRL 6, and TMC evaluates those plans against the Baseline Science Mission (Q&A 1)

MIDEX: AO – Requirement 23 and Requirement B-37

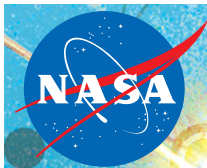
MO: SALMON-3 AO – Requirement 35 and Requirement B-46



5.8.4 Classified Proposal Appendix regarding Heritage (5.9.4 in SALMON-3 AO)

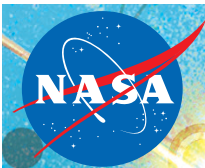
If a proposer chooses to submit a classified appendix regarding heritage, the requirements on content, format, and length are the same as, but independent from, those for the unclassified appendix regarding heritage included in the proposal (see Appendix B, Section J.12, for further details) with the exceptions that Letters of Validation and cost bases of estimate may be included in the classified appendix regarding heritage.

NASA allows three options for proposers to support heritage claims from classified programs: 1) delivery to NASA of a classified appendix regarding heritage, 2) “delivery in place” of a classified appendix regarding heritage, and subject to possible restriction 3) sponsor verification of the heritage claims derived from classified programs.



6.1.2 Notice of Intent to Propose (also 6.1.2 in the PEA Q)

- To facilitate planning of the proposal evaluation process, NASA requires all prospective proposers to submit a Notice of Intent (NOI) to propose.
- NOIs will help the evaluation teams to plans and secure the services of well qualified evaluators who do not have conflicts of interest earlier in the evaluation cycle.
- Include the names of as many team members as possible



2021 Astrophysics MIDEX AO Highlights

4.1.4 Mission Category and Payload Risk Classification

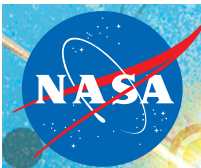
- Category 2 projects (per NPR 7120.5E) with Class C payloads (per NPR 8705.4A).

5.6 Cost Requirements and Constraints

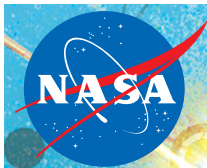
- The PI-Managed Mission Cost is defined in Section 4.3.1 of the AO.
- The AO cost cap for an Astrophysics Small Explorer mission is \$300 million in Fiscal Year (FY) 2022 dollars, not including the cost of standard launch vehicle and launch services, or any contributions.
- Any launch services beyond the standard launch services offered must be funded out of the PI-Managed Mission Cost.

5.9.2 AO-Provided Access to Space

- An Astrophysics Explorers investigations will be launched as the primary payload on a single launch vehicle. See *Launch Vehicle Program Information Summary* document for enveloping launch vehicle characteristics and capabilities.
- Alternate, non-AO-provided, or PI-provided access to space is not allowed under the MIDEX AO.



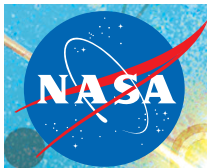
2021 Astrophysics SALMON-3 AO PEA Q Highlights



5.4.1 Schedule Requirements and Constraints

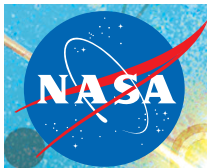
Proposal must specify the launch readiness date, which is to be no later than December 2027.

Proposers should be aware that it may be necessary for NASA to adjust the launch date and definition phasing of selected investigations from that proposed in order to conform to the available Explorers Program budget profiles and/or NASA's ability to negotiate a launch opportunity for a secondary payload, to cislunar space, or to the International Space Station; therefore, the degree of launch date flexibility must be indicated in the proposal.



5.3.3 Mission Category and Risk Classification

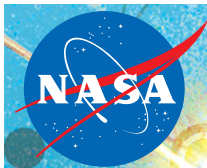
- This PEA solicits proposals for science investigations designated as Category 3 missions as defined in NPR 7120.5E, *NASA Space Flight Program and Project Management Requirements*, with payloads are designated as Class D as defined in NPR 8705.4, *Risk Classification for NASA Payloads*
 - Exception applies to hosted payloads and investigations deployed from another spacecraft, where the designation may be driven by the host mission's risk classification requirements, which must be specified in the proposal.
- All investigations solicited by this PEA must follow NASA SMD's new approach to managing Class-D science investigations as described in *NASA Science Mission Directorate (SMD) Class-D Tailoring/Streamlining Decision Memorandum*, approved by SMD leadership to guide in the implementation of Class D investigations. This memorandum, along with other Class-D policy and guideline documents, are in the the Program Library.



7.1 Scientific/Technical Evaluation Factors

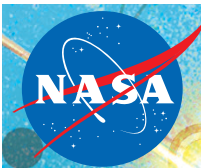
Proposals will be evaluated according to the evaluation criteria set forth in Section 7.2 of the SALMON-3 AO, with the following exceptions.

- Factor A-3 is deleted; Factor A-4 of SALMON-3 is renumbered as A-3
- The wording of Factors B-1 and B-3 is amended. See the PEA for details.
- Factor B-5 and Factor C-4 for Class D missions are amended to delete evaluation of the PI's spaceflight experience. In this factor, the *scientific* expertise of the PI will be evaluated but not his/her experience with NASA missions. Comments about the managerial experience of the PI, and whether appropriate mentoring and support tools are in place, will be made to the Selecting Official but these comments shall not impact the "Investigation Implementation Merit" rating.
- Factor C-2 is amended to delete evaluation of "ground systems and facilities". Ground systems and facilities are evaluated at Step 2 under Factor C-7.
 - Although ground systems and facilities are not evaluated under evaluation factor in C-2, associated schedule and cost impacts shall be included in the Step-1 proposals. See SALMON-3 Requirements B-34 and B-49 for schedule and Requirement B-55 for cost of the ground systems and facilities.

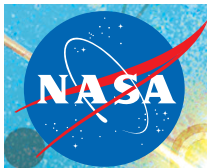


5.3.6.1 PEA-provided Rideshare Access to LEO or GTO

- Launches on an ESPA as a secondary or rideshare payload are offered as PEA-provided launch services to the following orbit categories:
 - a) To Low Earth Orbit (LEO) at 400km – 600km
 - b) To Geostationary Transfer Orbit (GTO)
- SCMs may be proposed for flight as CubeSats, or as constellations of CubeSats, when these are packaged for flight on an ESPA. The proposing team must provide the CubeSat dispenser, to be hard-mounted to the ESPA ring. Such SCMs will be treated as SmallSats.
- Rideshare Accommodation worksheets required for proposals utilizing LEO/GTO rideshare access to space as specified in Requirement Q-12.
 - Rideshare Accommodation worksheet template provided in the Program Library.
 - Table shall be provided in electronic form, and in the experiment implementation section (Section E) of the proposal. This table must summarize information from other sections of the proposal, and not provide new information; it will not be considered during the evaluation and does not count towards the proposal page limit.



References



MIDEX and MO Reference Material

2021 Astrophysics Explorers
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2021 Astrophysics MIDEX and MO Acquisition Page

The 2021 Astrophysics Explorer MIDEX and MO acquisition home page is available at <https://explorers.larc.nasa.gov/2021APMIDEX/>

The contents of the web site include the following:

- Links to MIDEX and MO pages
- 2021 Astrophysics MIDEX and MO news
- Community announcements
- betaSAM
- Teaming interest
- Preproposal conference



MIDEX Reference Material

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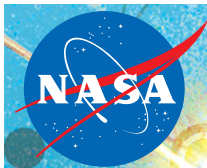
2021 Astrophysics MIDEX Acquisition Home Page

The 2021 Astrophysics MIDEX Acquisition Home Page available at <https://explorers.larc.nasa.gov/2021APMIDEX/MIDEX/index.html>, will provide updates and any addenda during the solicitation process. The contents of the MIDEX acquisition page include the following:

- Links to the NSPIRES for access to the solicitation
- Program library
- Evaluation plan
- Q&A

2021 Astrophysics MIDEX Program Library

The Library provides additional regulations, policies, and background information. The Library is accessible at <https://explorers.larc.nasa.gov/2021APMIDEX/MIDEX/programlibrary.html>



MO Reference Material

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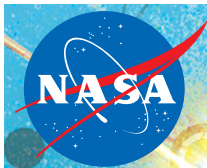
2021 Astrophysics Explorer MO Acquisition Home Page

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2021 Astrophysics Explorer MO Program Library

The Library provides additional regulations, policies, and background information. The Library is accessible at <https://explorers.larc.nasa.gov/2021APMIDEX/MO/programlibrary.html>. Use Table B3b template in the program library to develop cost funding profile.

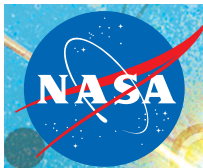


TMC Evaluation

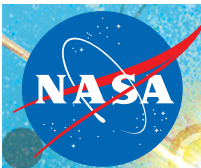
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Common Causes of Major Weaknesses References

- Technology Readiness Level:
 - *Assessment of TRL in AO-Based Evaluations and Common Causes of Major TRL Weaknesses*
 - Located in Program Libraries
- Management:
 - *Common Management Major Weaknesses in Step One Proposals*
 - Located at SOMA website:
<https://soma.larc.nasa.gov/tmcII/ManagementFindingsStudy-to-post-R3.pdf>



Questions?



**All further questions pertaining to the MDEX AO or PEA Q MUST
be addressed by email to:**

**Dr Linda Sparke
Astrophysics Explorers Program Scientist
Science Mission Directorate
NASA Headquarters
Washington, DC 20546
linda.s.sparke@nasa.gov
(subject line to read "MDEX AO or PEA Q as applicable")**